

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 57

October, 1955

No. 682

THE VEGETATION OF SANIBEL ISLAND LEE COUNTY, FLORIDA

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INTRODUCTION

SANIBEL ISLAND lies in the Gulf of Mexico, a few miles off the southwestern coast of peninsular Florida near the mouth of the Caloosahatchee River about fifteen miles from the city of Fort Myers. Lying as it does, less than three degrees north of the Tropic of Cancer, Sanibel Island has many characteristics of tropical and sub-tropical insular areas. Furthermore, being only a few miles from the mainland, the island has the appearance of many sections of South Florida. Yet it is not exactly the same as any region of the tropics or of Florida, historically, geographically, geologically, or botanically. Occupied by white people for little more than seventy years, influenced by rivers, ocean currents, and mighty storms; made up almost entirely of shells and shell material; and the home of plants of the tropical, sub-tropical, and temperate zones, it is unlike, in many respects, any area to be found in the southern United States.

HISTORY OF SANIBEL

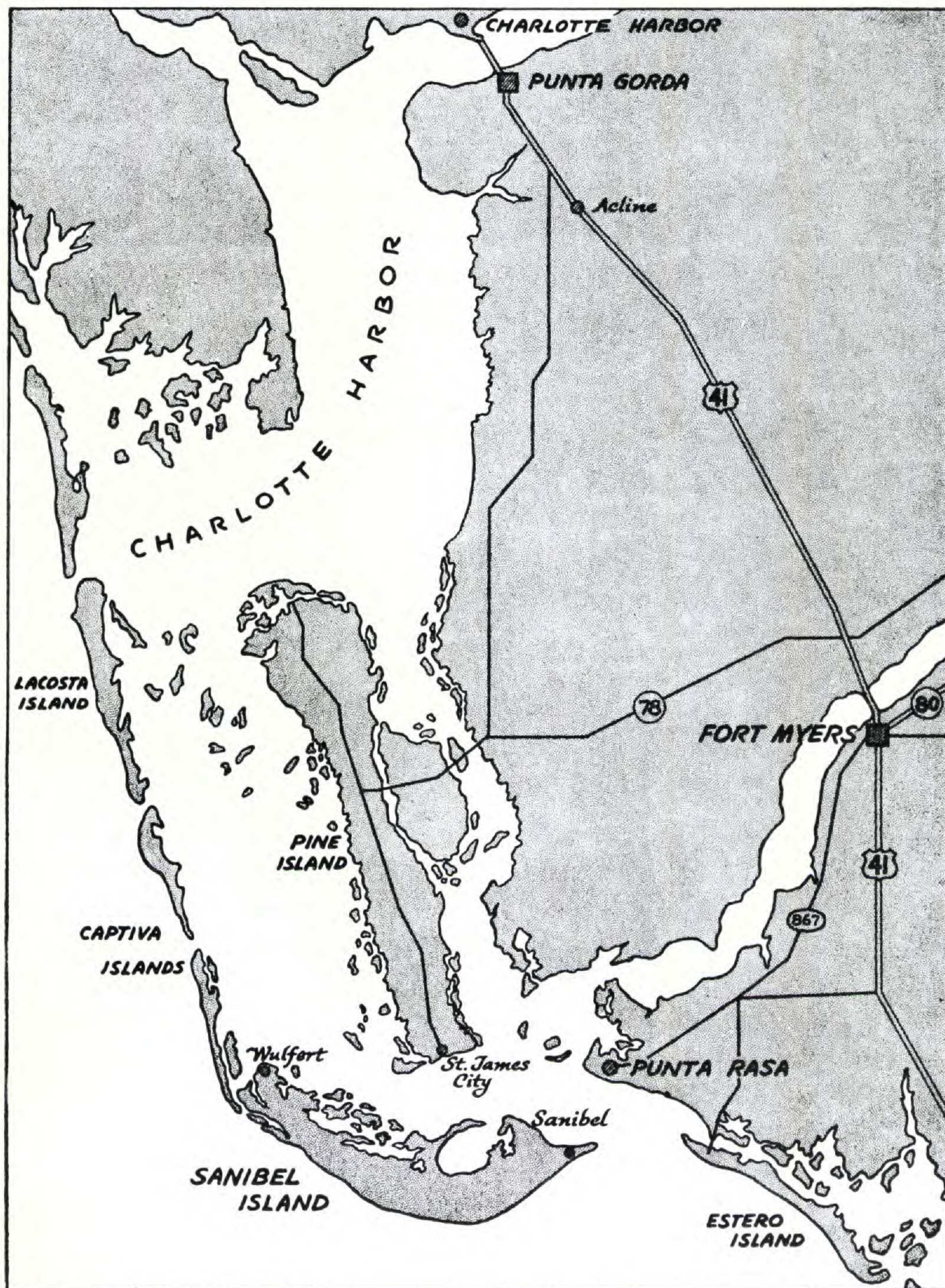
It is said that on his trip to the Gulf of Mexico and Mississippi River in 1539, De Soto stopped at Sanibel Island. Captain Bernard Romans, "Draugh^m Mathemⁿ Navigat^r," and "Naturalist & Botanist" in 1774, when describing the region around Charlotte Harbour north of Sanibel, said, "This nook in the land forms what the Spaniards call *Ensenada de Carlos*, i.e. Charle's Bay: the piece of coast that trends E. and W. is the beach of an island called Sanybel, This place is further remarkable

for a great number of pine-trees without tops, standing at the bottom of the Bay, like which there is no spot in the whole extent of this coast. The northernmost entrance is likewise remarkable for a singular hummock, or grove of pine-trees, standing very near the beach, and the only one of its form and kind in all these parts." No other records seem to be extant which would help us in an understanding of the flora of this island before its discovery by the white man four hundred years ago, or for that matter at any time up to the present.

At the time of De Soto's exploration and for three hundred years thereafter a tribe of Muspah Indians apparently made their homes on Sanibel Island and nearby Captiva Island. Great kitchen middens, mostly shells, give evidence of long tenure by these Indians. Mr. Julien C. Yonge of the Library of Florida History found in early records that in 1831 a New York company set up a colonial development at the eastern end of the island; there were also comments of a traveler to the effect that two years thereafter no evidence of this development remained except the framework of the largest house. About 1883 an agricultural and horticultural development started which was to change the face of the island for a period of over forty years. All the arable land on the island was cleared and cultivated (Map C). Citrus fruits and garden vegetables, principally tomatoes, eggplants, and squashes, were raised in considerable quantities. Boats came from the terminus of the railroad on the mainland a score of miles to the north to collect the produce. It is reported that one gardener in 1901 received \$1,100 for the tomatoes grown on one acre of ground. In time, competition from the mainland lessened the prosperity of Sanibel farmers so that when a disastrous hurricane struck the island in 1926, half the population left. Those who remained have served winter visitors, fishermen, and shell collectors, for Sanibel has become known as one of the three great shell collecting beaches of the world. The replacement vegetation of the previously cultivated land is now again steadily progressing toward a climax.

GEOGRAPHY

All of the islands off the west coast of Florida lie north and south like reefs along the shoreline of the peninsula except



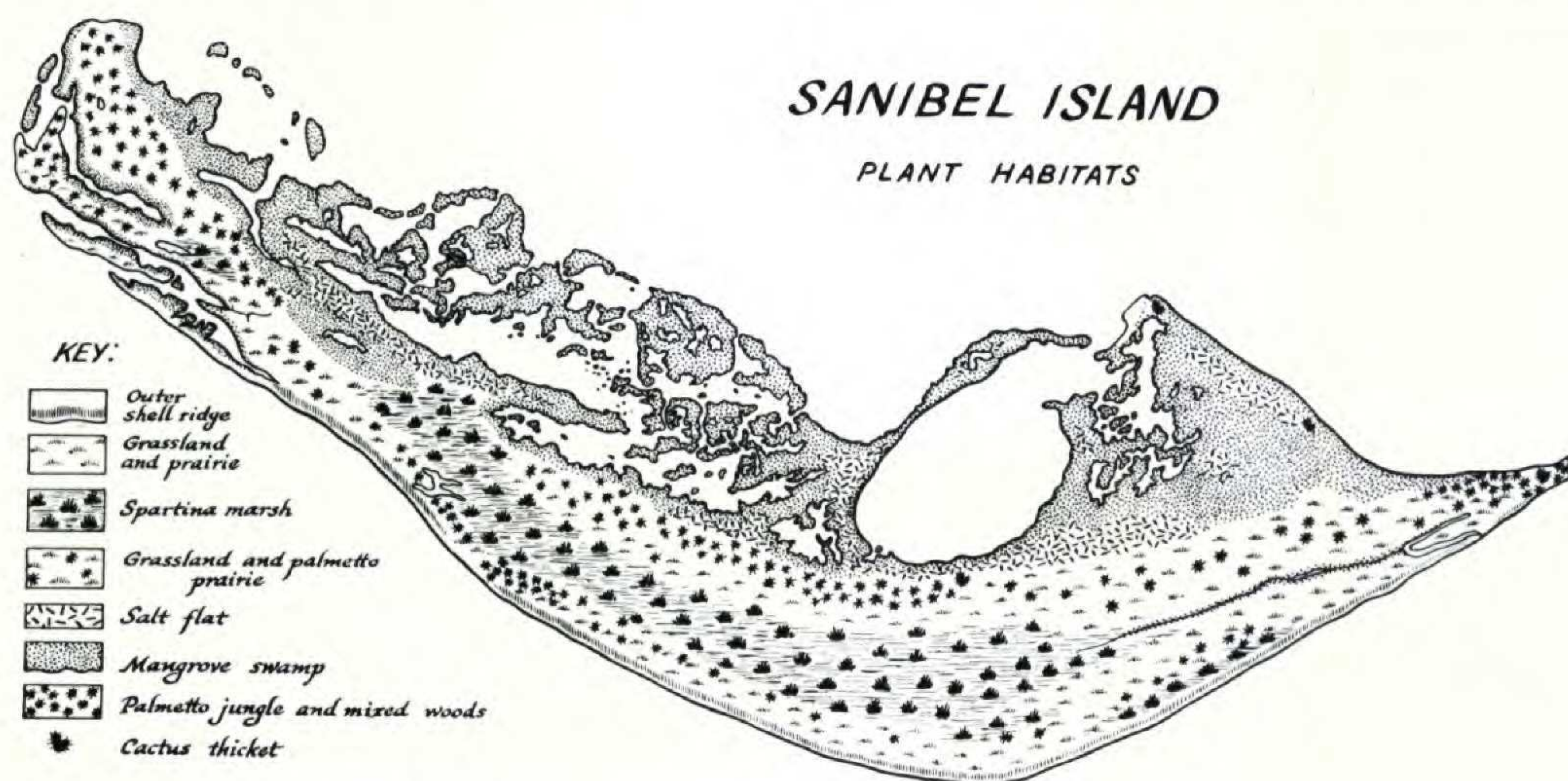
MAP A. The Charlotte Harbor area of southwestern Florida, showing the location of Sanibel Island

Sanibel which lies east and west, at right angles to the others, taking the full brunt of storms from the south and being subjected to the constant flow of a northward moving gulf stream. The island is about 10.75 statute miles long and 2.6 statute miles across at its widest point; it lies at $26^{\circ} 30'$ N. latitude and $82^{\circ} 10'$ W. longitude (Map A.)

Nowhere is the land more than fourteen feet above the level of the Gulf of Mexico. The elevation of most marsh areas is six feet or less; the grasslands, six to eight feet, and the hammocks and former cultivated areas from six to fourteen feet above sea level.

From the aerial photograph (Plate 1214, fig. 2) one can obtain a general idea of the geographical features and vegetation of the island. At the rounded point to the east is a 70-foot lighthouse; west of it can be seen a road bordered by casuarina trees. At this point there is the ferry landing, a restaurant, the post office and the home of the postmistress. On both sides of this road, which crosses the narrow end of the island, can be seen cleared areas representing an incipient real estate development. The dark space toward the lighthouse is a rather dense button mangrove thicket; the black spots represent red mangroves. The rest of the dense growth consists of button mangrove (*Conocarpus erecta*) and its associates, with a cactus thicket at the side toward the lighthouse. In the photograph the dark mass in the upper left indicates the presence of red mangrove swamps, which form matted growths along most of the inner shore on Pine Island Sound. The lighter-colored sweeps of gray are button mangrove swamps where airplants grow in abundance. A road extends east and west through the middle of the island. This is now a well-maintained macadam highway connecting by a concrete bridge at the west end of the island with neighboring Captiva. Along this road can again be seen rows of casuarinas planted about 1912 to 1914. South of the main road the grasslands are extensive, changing into *Spartina* marshes where the land is lower between the ancient shell ridges. Over the part of the island not shown the *Spartina* marshes are very much larger, being fully one-half mile in breadth and far-reaching in extent. A natural drainage area is shown by the irregular dark line through the center of the grasslands. The

straight white line indicates the road leading to the island's only general store and a community of winter dwellings. From this road toward the west, on the north side of the main highway, one can see formerly cultivated fields. A large part of the land on both sides of the main road from this section across the entire island is where the farming of the 1883–1928 period was done. The design at the lower left shows a winter resort. There are



MAP B. The principal habitats and vegetational groupings on Sanibel Island.

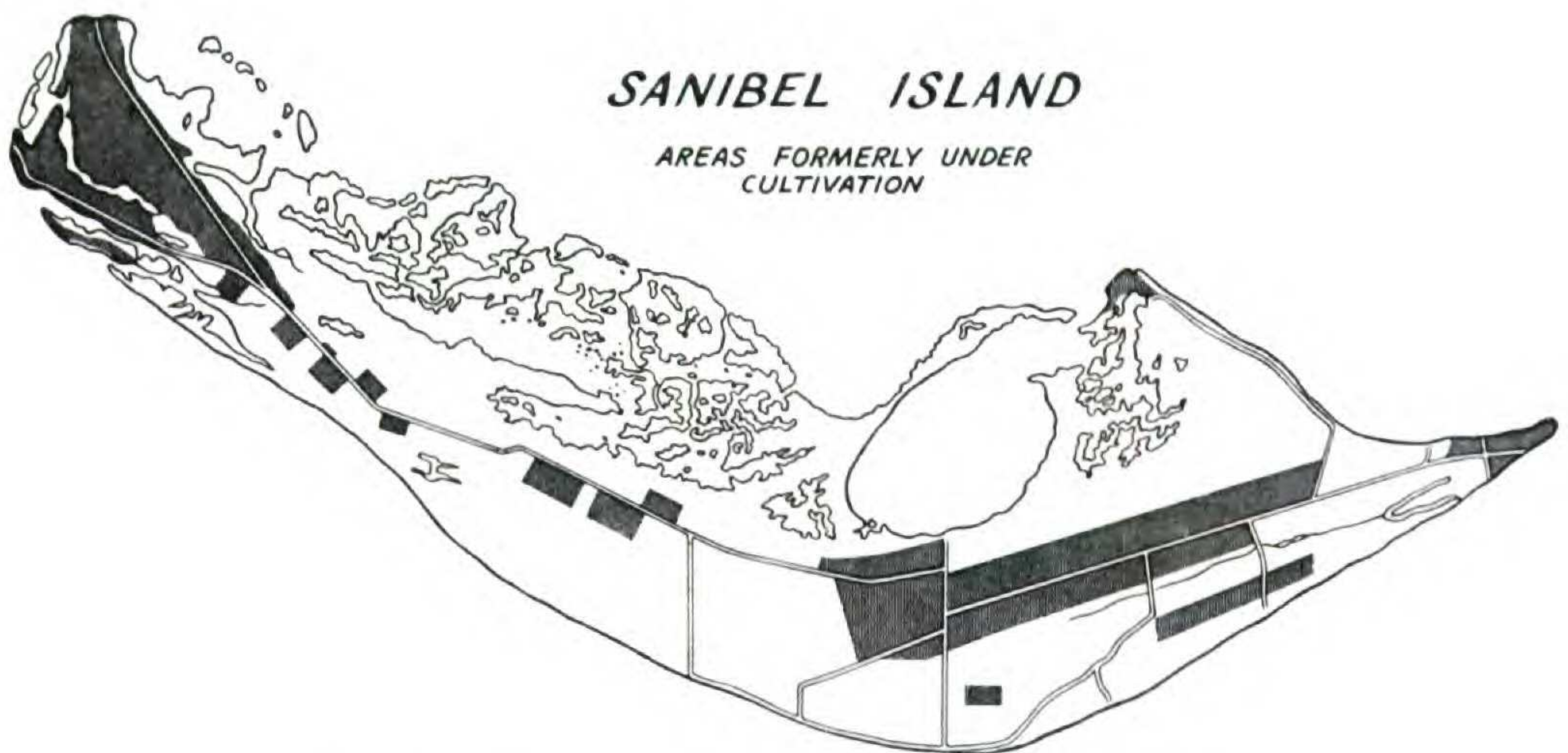
four such regions on the Gulf side of the island. Plate 1213 is an aerial photograph of the east central portion of the island. It shows vegetational features similar to those described above.

ECOLOGICAL FEATURES

The beach on the Gulf side ends abruptly at a ridge of shells washed up by a previous great storm. The island, other than the mangrove swamps and inner salt marshes, is made up of ridges more or less parallel to the Gulf shore. In ages past these ridges were formed in the same way as the present outer ridge which was created by the storm of October, 1953. Great quantities of shells were washed up onto the beach and over the beach-strand vegetation, burying all but the tallest of the shrubs and trees (Plate 1214, Fig. 1). Four and five feet of shells covered the strand for varying widths of fifty to one hundred-fifty feet forming a new ridge. Back of the new ridge is a marsh of *Spartina* and its associates growing up through broken shells. Successive ridges and low places produce prairie growths and

marsh vegetation, then transition vegetation and hammocks as the distance lengthens from the beach (Map B).

The inner north shore facing the quiet waters of Pine Island Sound is free from the effects of waves and storms and the vegetation consists of a great mangrove swamp. Back of the mangroves are tidal marshes, back of these on slightly higher ground are button mangroves bordering on hammocks and mixed woods as the elevation increases.



MAP C. Former cultivated areas of Sanibel Island.

Among the red mangroves organic muck has formed to the depth of several feet; in the *Spartina* marshes a foot or more of humus has accumulated; but all other soils are made up of decomposing shell material and varying amounts of decaying vegetable matter.

Evidence of human occupation and disturbance in the form of ditches old and new, abandoned homesites, fence-rows, and former groves, give character to much of the higher ground. (See Map C showing formerly cultivated land, as defined by an old resident.)

Research discloses meager records of the flora of Sanibel and few specimens indeed are in herbaria of America. Botanists have neglected this interesting place. At the suggestion of Dr. Richard A. Howard the writer was prompted to undertake a floristic study of Sanibel and to that end made a winter's stay on the island and two subsequent visits to it.

A. S. Hitchcock visited Sanibel in 1900, and three specimens collected by him at that time have now been located at the Gray Herbarium. He was probably the instigator of S. M. Tracy's trip to Sanibel in 1901, when the new species *Eragrostis tracyi* Hitchcock was collected, but no notes and only few specimens of this trip can now be found. George A. Orric collected on neighboring Captiva Island in 1915, but it is not known that he made any study of Sanibel. On January 24, 1924 Roland M. Harper spent a few hours on the island and, as stated in a letter to the author, "took what notes I could on the vegetation, and a few pictures, but do not think I collected any plants." James B. McFarlin did some collecting on Sanibel November 4, 1934, incidental to his study of the flora of Polk County, central Florida. In 1936, J. R. Swallen collected five grasses; and in 1951, R. Bruce Ledin spent two days on Sanibel collecting 52 numbers for the Buswell Herbarium at the University of Miami. Ledin collected plants of Sanibel that were typical of the Florida Keys of Monroe County. He was amazed at the number of identical species found in both places. About 35 of 52 species collected were considered to be essentially West Indian plants. Specimens in the herbarium of the University of Florida (from Sanibel) are probably less than a dozen, according to Miss Lillian E. Arnold, Curator. John H. Davis and the writer spent a day on Sanibel in 1951, but did little collecting.

Of all these visits few comments remain for our understanding of the flora of Sanibel. In 1927 in "Natural Resources of South Florida" Harper said of the West Coast islands, "the vegetation comprises that of beaches and dunes, cactus thickets, salt flats, palm savannas, mangrove swamps, and a little tropical hammock. There is a little truck-farming on some of the islands, such as Sanibel."

This study purports to provide a general understanding of the ecology of the Island and its present vegetation to the end that comparisons in the future may be accurately made.

VEGETATIONAL FEATURES

Even the casual visitor to Sanibel is impressed by the number and ubiquity of the cabbage palm (*Sabal palmetto*). Throughout the island it is found in almost all habitats, giving its name to

some, as cabbage palm prairie (Plate 1215, Fig. 3) to the grasslands, and cabbage palm jungle to the hammocks. A quarter of a mile from the ferry landing adjoining the oldest settlement area on the island is a stand of *Sabal palmetto* reminding one of a mature reforestation plantation so tall, so straight, and so dominant are the trees of this species.

Clinging to the cabbage palms and often growing rampant over them are *Rhus radicans* and less frequently *Parthenocissus quinquefolia*. Living on them epiphytically are *Ficus aurea*, *Vittaria lineata*, and *Phlebodium aureum* and that strange cryptogam of the sub-tropics, *Psilotum nudum*, with slender, branching, delicate stems is sometimes found at the base of the cabbage palms.

Another tree which is characteristic of the modern Sanibel landscape is the Australian pine (*Casuarina equisetifolia*) which lines many of the roads and beaches. Brought to the island about forty-five years ago, *Casuarina* has become well established. By the distribution of vast numbers of seeds it has extended its territory far beyond the roadsides and beach strands where it was originally planted. At one place in the center of the island it has multiplied to the point of forming a wood where it tends to become dominant. On Wulfert Road is a row of *Casuarina cunninghamiana* about 30 to 40 years old. This species is apparently not becoming naturalized.

From the main black-top road which extends through the center of the island for its entire length, mangroves are noticeable at only one point. However, a boat ride along the inner shore for almost the entire length of the island reveals a mangrove swamp of eight square miles. Dominant at the water's edge is the red mangrove (*Rhizophora mangle*), its interlacing and arching trunks, branches, and roots forming a maze through which progress can be made only with persistence and a sharp machete. Wherever the soil has been built up above the mean tide level, black mangroves (*Avicennia nitida*) appear with trunk diameters up to 4" at breast height. Deeper in the swamp (hence rarely seen from a passing boat) and only where the soil is generally above the tide are the white mangroves (*Laguncularia racemosa*), attaining a size no greater than large shrubs.

Between the red mangrove swamps and the hammocks and cabbage palm savannas toward the middle of the island are

interesting belts of button mangroves (*Conocarpus erecta*, Plate 1215, Fig. 4). Here flourish air plants in some profusion; not much Spanish moss (*Tillandsia usneoides*) but an abundance of *Epidendrum tampense*, *Tillandsia fasciculata*, *T. balbisiana*, *T. utriculata*, and *T. tenuifolia*. At four places cactus thickets have been formed among the button mangroves; wicked places for the botanist, but happy homes for gopher snakes which grow to lengths of seven and eight feet.

As the button mangroves become numerous, extending toward the center of the island (Plate 1216, Fig. 6), they are joined by an interesting transition group of a score or more of hammock trees and shrubs, including the following:

Ardisia escallonioides
Baccharis glomeruliflora
Chiococca alba
Dodonaea jamaicensis
Eugenia anthera
Eugenia myrtoides
Eugenia axillaris
Forestiera porulosa
Jacquinia keyensis
Pithecellobium unguis-cati

Randia aculeata
Phytolacca rigida
Rivina humilis
Zanthoxylum fagara
Capparis cynophallophora
Rapanea guianensis
Sideroxylon foetidissimum
Bumelia angustifolia
Psychotria nervosa

On the larger of these trees, Spanish moss grows more abundantly than other air plants. Cabbage palms are present, acting as hosts to the shoestring fern (*Vittaria lineata*), the golden polypody (*Phlebodium aureum*), and young growths of the strangling fig (*Ficus aurea*) (Plate 1216, Fig. 5). They also support a vigorous growth of poison ivy (*Rhus radicans*) and Virginia creeper (*Parthenocissus quinquefolia*).

The writer should mention here Sanibel's second worst pest (mosquitoes are first), poison ivy. Apparently it will not tolerate salt water and is therefore not found in the mangrove swamps or the salt marshes. The beaches and the black-top road do not provide happy homes for *Rhus radicans* either, but every other habitat is congenial to it. On a cabbage palm was found a poison ivy plant with a stem 9 cm. in diameter at breast height. One branch 13 dm. long bore 6,130 blossoms. Often leaves are found 10 cm. wide and 20 cm. long. On the cabbage palms some poison ivy plants grow 10 meters high. In a cabbage palm thicket six hundred seventy-two poison ivy plants or sprouts were counted in a quadrat twenty by twenty feet.

In the buttonwood swamps and the hammocks and near Indian shell mounds has grown the tree cotton (*Gossypium hirsutum*). For a long time, despite the fact that commercial cotton is not raised within two or three hundred miles of Sanibel, the Department of Agriculture has sent four men to the island several times a year to rid it of wild cotton and thus deprive the boll weevil of food and a breeding place. The species has persisted but is now almost extinct on Sanibel as only three young plants were found in a two-day search in February (1954).

Hammocks on Sanibel vary greatly. As indicated above, one hammock is a stand of pure *Sabal palmetto*; many are *Sabal palmetto* jungles where trees, shrubs, vines and herbs compete; some in the center of the island are distinguished by *Quercus virginiana*; and some are mixed forests. The gumbo limbo tree (*Bursera simaruba*), although frequent and widespread through the higher elevations of the island, is nowhere abundant. Because of its red bark it is often mistakenly called mahogany by natives and visitors alike. In a mixed wood on Wulfert Road stands a slash pine (*Pinus elliottii* var. *densa*) with several younger trees near by. Millions of slash pines grow on the mainland and yet Sanibel can boast of but one small colony.

Several square miles of *Spartina* marshes lie between the principal hammocks and the coastal shell ridge. Here the dominant is *Spartina bakeri*, accompanied by *Cladium jamaicense*, *Andropogon glomeratus*, *Bacopa monnieri*, and *Sesuvium portulacastrum* (Plate 1217, Fig. 7). In the marshes the presence of ancient shell ridges is evidenced by plants which prefer slightly drier ground. Luxuriant growths appear of *Baccharis halimifolia*, *Sporobolus domingensis*, *Aristida patula*, *Fimbristylis castanea*, *Flaveria linearis*, *Kosteletzkya virginica*, *Mikania batatifolia*, *Rhus radicans*, *Melothria pendula*, *Melanthera deltoides*, and on still higher ground *Sabal palmetto* and its prairie associates (Plate 1217, Fig. 8).

The grass lands between the coastal shell ridge and the *Spartina* marshes are largely dry open areas in which the following species grow:

Bouteloua hirsuta
Sporobolus virginicus
Aristida patula
Chloris petraea

Piriqueta caroliniana
Pluchea purpurascens
Rhynchosia michauxii
Samolus ebracteatus

Bidens pilosa
Cirsium horridulum
Coreopsis leavenworthii
Flaveria floridana
Flaveria linearis
Gaura angustifolia
Opuntia austrina
Physalis elliotii

Sida carpinifolia
Waltheria americana
Conyza canadensis
Vigna repens
Lochnera rosea
Crotalaria striata
Cassythia filiformis
Cenchrus pauciflorus

The shrubby areas also present are composed of:

Forestiera porulosa
Baccharis halimifolia
Myrica cerifera
Ernodea littoralis
Eugenia axillaris
Jacquinia keyensis

Lantana involucrata
Lantana ovatifolia
Sophora tomentosa
Trichostema suffrutescens
Capraria biflora

Charles Torrey Simpson said "To the naturalist . . . the seashore is the most fascinating place in the world."¹ On Sanibel's seashore the coastal shell ridge—a pile of countless shells—influences the botanist by some powerful and irresistible charm. To be sure, the hand of man has contributed to the flora of the coastal ridge by his plantings of *Casuarina equisetifolia* to bind the soil and break the wind, but the hand of nature has brought to the beach strand other plants entrancing in their characteristics and different in their forms and habits.

Coccoloba uvifera, the sea grape, changes in appearance many times a year. Its shiny, bright new leaves in March replace the dull "platter" leaves which fall to cover the earth beneath; then 15 cm. spikes of greenish yellow flowers extending from the axils of pairs of near-opposite leaves attract the bees and insects; clusters of large fruit of deepening color tempt the local housewives to make sea-grape jelly; then the aging leaves grow dull again and await the rebirth of another spring.

A pan-tropical half-shrub, *Scaevola plumieri* (Fig. 9) tolerates the salt spray and saline soil of the upper beach. Its succulent leaves retain a full green color throughout the year; its springtime white flowers have five white involute petals arranged palmately in a plane.

The active waters of the beach give *Rhizophora mangle* no chance for a footing, and the dry character of the ridge excludes *Avicennia nitida* and *Laguncularia racemosa*. *Conocarpus erecta*,

¹ "In lower Florida wilds," page 276. New York. 1920.

the button mangrove, has more success along the coastal shell ridge, generally near the marshes or in man-made ditches (Plate 1218, Fig. 10). The cinereous form of *Conocarpus erecta* grows at four stations, none of them near the coast. On the neighboring island of Captiva *Ambrosia hispida* forms runners exceeding fifty feet, but on Sanibel the plant is rare and small. Another soil-binder, however, is by no means so rare; *Ipomoea pes-caprae*, the railroad vine, climbs over both the ground and the vegetation.

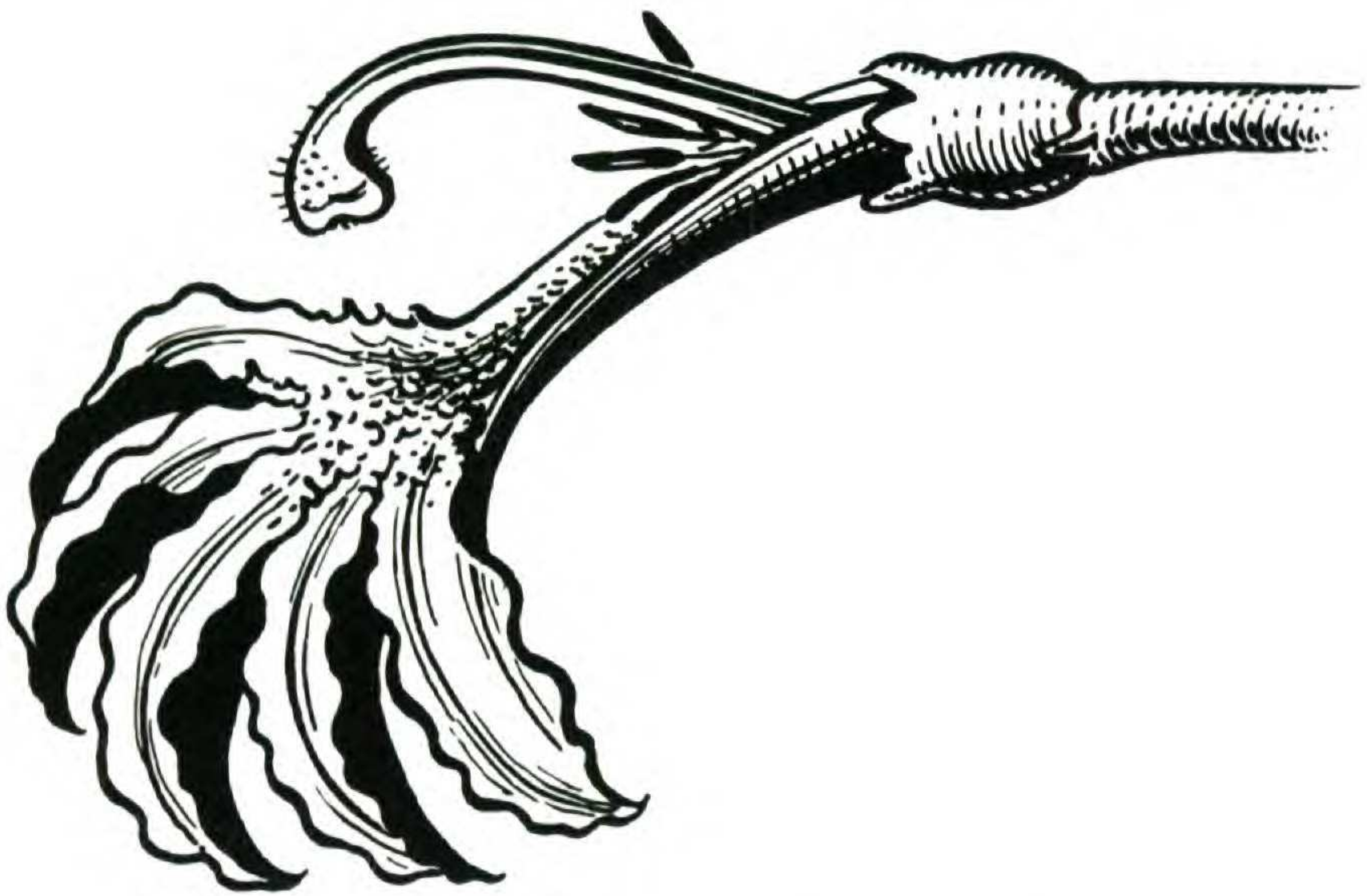


Fig. 9. Flower of *Scaevola plumieri*, $\times 4$.

Most abundant of the shrubby growths of the coastal shell ridge is *Suriana maritima*, the bay cedar, in the West Indies often called tassel plant, with small yellow flowers and alternate entire leaves. With it are scattered plants of *Uniola paniculata* with culms two meters in height. These sea oats serve to bind the coastal soil but are never dominant on Sanibel.

I collected what appeared to be two species of *Oenothera* occur on the beach, one with yellow flowers and one with reddish flowers. Both are *Oenothera humifusa*, whose flowers are yellow when new blown and reddish when older, the change taking place even from morning to afternoon.

The creeping plants of the marshes, *Sesuvium*, *Portulaca*, and the salt-tolerant grasses of the wet areas are not found on the coastal ridge, for it is a dry habitat where rain filters quickly

through the crushed shell aggregate. It is to be expected that *Calonyction* should clamber over the shrubs of the coastal shell ridge, but *Calonyction tuba* grows only on the low ridge at the inner side of the island where storms are not severe and *Calonyction aculeata* lives mostly one hundred fifty yards and more back from the gulf beach.

Common on the coastal ridge is *Baccharis halimifolia* and less frequent is *Baccharis dioica*. The ordinarily entire leaves of the latter are here sometimes indented, possibly from hybridization. It has the distinctive habit of extending its tap root horizontally just beneath the ground at right angles to its stem.

From one end of the island to the other on twelve miles of outer shell ridge many native, adventive, and waif species make their homes. *Solidago sempervirens* var. *mexicana* is present but not abundant. *Bidens pilosa*, with its bright yellow-centered flower heads, is much more abundant, and its barbed achenes, known as Spanish needles, cling tenaciously to everyone who brushes past the plant. Mention should be made of the chaff flower (*Achyranthes ramosissima*). This tropical herb of the amaranth family has a spreading manner of growth among the herbs and low shrubs. *Cakile* (Plate 1221, Fig. 17) is widespread through the sub-tropics, but only one species of it (*Cakile fusiformis*) is found on Sanibel and at only one spot on disturbed ground near a real estate development.

There is only one extensive broad beach area (Plate 1219, Fig. 13), and that toward the western end of the island. This beach is up to two hundred yards wide, and is composed of both quartz sand and shell fragments, but unlike typical sandy beaches drifts little. Such vegetation as manages to exist in the broiling sun and salt air includes *Sesuvium portulacastrum* (Plate 1219, Fig. 12), *Suriana maritima* (Plate 1220, Fig. 14), *Scaevola plumieri*, *Euphorbia buxifolia*, *Oenothera humifusa*, *Iva imbricata*, *Atriplex arenaria*, *Uniola paniculata*, *Sporobolus virginicus*, *Spartina patens*, and *Ipomoea pes-caprae*. The rolling beach grades downward into marshes with a varied border of *Dalbergia ecastophyllum*, *Coccoloba uvifera*, *Suriana maritima*, *Conocarpus erecta*, *Casuarina equisetifolia*, and other shrubs.

The white panicles of *Yucca aloifolia* do not last long but for a short time offer a spectacle to those "shellers" whose eyes are

raised from the beach. No other *Yucca* grows on Sanibel. *Chloris petraea*, *Lochnera rosea*, *Rhus radicans*, *Cenchrus pauciflorus*, *Sporobolus virginicus*, *Euphorbia* spp., *Heliotropium parviflorum*, *H. polyphyllum*, *H. curassavicum*, *Conyza canadensis*, and *Asclepias verticillata* are a few of the vascular plants crowding the slopes and crest of the coastal shell ridge.

Eragrostis tracyi was described as a new species from a collection made on Sanibel in May, 1901. It was not collected again on Sanibel until April 13, 1954, but has never been found elsewhere. It is common on disturbed ground, roadsides, lawns, around homes, and in cleared areas. Diligent search over grasslands and savannas produced no plants. The habitat it occupies leads one to believe that *Eragrostis tracyi* has been introduced onto Sanibel. But from where did it come?

CHECK LIST

Nomenclature provides a problem for the taxonomists of the Southern States. No manual exists to which a botanist can go for names of southern plants in keeping with recent taxonomic studies and judgment, and in conformity with the International Code of Nomenclature. The author searched the monographs and writings of the last twenty years and has used the names which in large part conform to the best present-day usage.

Mr. Jason R. Swallen, of the United States National Museum, identified the grasses collected, and Professor Erdman West and Miss Lillian E. Arnold of the University of Florida helped with the determination of all other specimens. Specimens have been deposited in the United States National Museum, the Gray Herbarium, the herbarium of the New York Botanical Garden, the herbarium of the University of Florida, and the Cooley Herbarium of Rensselaerville, New York.

In the check list which follows seven habitat columns are used after Lemon (ms). The column headed Mangrove Swamps for convenience includes red mangrove swamp plants; *Spartina* Marshes include salt marsh plants; and Grasslands and Savannas combine both wet and dry areas. Frequent ancient shell ridges throughout the island increase the elevation slightly at many points, providing congenial habitats for plants of dry preference in the midst of damp and wet areas. No effort has

been made to define these habitats precisely; rather general ecological names have been used.

DEFINITIONS

- Dominant* (D) Prevailing, tending to drive out all other plants and to resist invasion by them.
Abundant (A) Teeming, in copious supply.
Common (C) General, not local, so frequent as to be found easily.
Frequent (F) Often to be met with, but not general.
Infrequent (I) Isolated, sparse, occurring at considerable distances.
Rare (R) Seldom met with, so infrequent as to be unexpected.

	Old fields	Coastal shell ridge	Spartina marshes	Grasslands & savannas	Mangrove swamps	Palmetto jungles	Mixed woods
<i>Chara zeylanica</i> Klein in Willd.			I				
<i>Psilotum nudum</i> L.						I	I
<i>Acrostichum danaeaeifolium</i> Langsd. & Fisch.			A				
<i>Blechnum serrulatum</i> Rich.	F					F	F
<i>Nephrolepis exaltata</i> (L.) Schott	I					I	
<i>Phlebodium aureum</i> L.						C	F
<i>Polypodium polypodioides</i> (L.) Watt							R
<i>Pteridium aquilinum</i> (L.) Kuhn, var. <i>caudatum</i> (L.) Sadebeck	I						
<i>Pteridium aquilinum</i> (L.) Kuhn, var. <i>pseudo-</i> <i>caudatum</i> (Clute) Heller	I						
<i>Vittaria lineata</i> Sw.						F	F
<i>Typha angustifolia</i> L.			I				
<i>Typha domingensis</i> Pers.			F				
<i>Pinus elliottii</i> Engelm., var. <i>densa</i> Little & Dorm.							I
<i>Najas guadalupensis</i> (Spreng.) Morong			I				
<i>Andropogon glomeratus</i> (Walt.) BSP.	F		I	F			
<i>Andropogon virginicus</i> L.		F					
<i>Aristida patula</i> Chapm. ex Nash				F			
<i>Aristida purpurascens</i> Poir.				I			
<i>Bouteloua hirsuta</i> Lag.				A			
<i>Cenchrus echinatus</i> L.	F	F		I			
<i>Cenchrus incertus</i> M. A. Curtis	C	I					
<i>Cenchrus pauciflorus</i> Benth.	C	C		F			
<i>Chloris petraea</i> Swartz	C	C		C			
<i>Cladium jamaicense</i> Crantz			C				
<i>Cynodon dactylon</i> (L.) Pers.		I	C				
<i>Dactyloctenium aegyptium</i> (L.) Beauv.	I						
<i>Digitaria sanguinalis</i> (L.) Scop.	F						
<i>Distichlis spicata</i> (L.) Greene			C				
<i>Eleusine indica</i> (L.) Gaertn.	C	F					
<i>Eragrostis ciliaris</i> (L.) R. Br.						I	
<i>Eragrostis elliottii</i> S. Wats.	I						
<i>Eragrostis pilosa</i> (L.) Beauv.	I						
<i>Eragrostis tracyi</i> Hitchc.	C						
<i>Leptochloa dubia</i> (H. B. K.) Nees.	C	F		C			
<i>Muhlenbergia capillaris</i> (Lam.) Trin.				F			
<i>Panicum adspersum</i> Trin.	F						

	Old fields	Coastal shell ridge	Spartina marshes	Grasslands & savannas	Mangrove swamps	Palmetto jungles	Mixed woods
<i>Panicum agrostoides</i> Spreng.		F					
<i>Panicum albomarginatum</i> Nash	F						
<i>Panicum amarulum</i> Hitchc. and Chase		F					
<i>Panicum bartowense</i> Scribn. & Merr.	F						
<i>Panicum dichotomiflorum</i> Michx.	C						
<i>Panicum neuranthum</i> Griseb.	F			F			
<i>Panicum virgatum</i> L.				F			
<i>Paspalum ciliatifolium</i> Michx.	I			I			
<i>Paspalum vaginatum</i> Swartz		F		F			
<i>Pennisetum glaucum</i> (L.) R. Br.	I						
<i>Rhynchelytrum roseum</i> (Nees) S. & H.	C						
<i>Setaria geniculata</i> (Lam.) Beauv.	F	F	C				
<i>Setaria glauca</i> (L.) Beauv.	F			F			
<i>Setaria macrosperma</i> (Scribn. & Merr.) Schum.	I						
<i>Sorgum halepense</i> (L.) Pers.	I						
<i>Spartina bakeri</i> Merr.			D	I			
<i>Spartina patens</i> (Ait.) Muhl.		F					
<i>Sporobolus domingensis</i> (Trin.) Kunth		C					
<i>Sporobolus juncea</i> (Michx.) Kunth		I					
<i>Sporobolus virginicus</i> (L.) Kunth		A					
<i>Triplasis purpurea</i> (Walt.) Chapm.	R	I					
<i>Uniola paniculata</i> L.		C		I			
<i>Cyperus globulosus</i> Aubl.	I			I			
<i>Cyperus ligularis</i> L.	C	F		F			
<i>Cyperus martindalei</i> Britton	I						
<i>Cyperus planifolius</i> L. C. Rich.		I	F	C			
<i>Cyperus polystachyos</i> Rottb., var. <i>texensis</i> (Torr.) Fern.	F		C	I			
<i>Cyperus pseudovegetus</i> L.	I						
<i>Cyperus rotundus</i> L.	I						
<i>Cyperus strigosus</i> L.			I				
<i>Dichromena colorata</i> (L.) Hitchc.	C			C			
<i>Eleocharis atropurpurea</i> (Retz.) Kunth	C						
<i>Eleocharis geniculata</i> (L.) R. & S.			F				
<i>Fimbristylis castanea</i> (Michx.) Vahl	C			C			
<i>Scirpus americanus</i> Pers.			F				
<i>Scirpus cyperinus</i> (L.) Kunth, var. <i>erriophorum</i> Michx.				I			
<i>Cocos nucifera</i> L.	F	I					
<i>Sabal palmetto</i> (Walt.) Torr.	C	F		F		D	F
<i>Serenoa repens</i> (Bartr.) Small				D		F	
<i>Lachnocaulon anceps</i> (Walt.) Morong			R				
<i>Tillandsia balbisiana</i> Schult.					C		
<i>Tillandsia circinata</i> Schlech.					I		
<i>Tillandsia fasciculata</i> Sw.					C		
<i>Tillandsia recurvata</i> L.	I				I		I
<i>Tillandsia tenuifolia</i> L.					C		
<i>Tillandsia usneoides</i> L.					F		
<i>Tillandsia utriculata</i> L.					C		
<i>Commelina erecta</i> L.	F						
<i>Juncus megacephalus</i> M. A. Curtis				I			
<i>Sansevieria guineensis</i> Willd.	Escape						
<i>Smilax auriculata</i> Walt.						F	F



PLATE 1214. FIG. 1, Recently formed shell ridge. FIG. 2, Aerial photograph showing ancient shell ridges paralleling the south coast.



PLATE 1215. FIG. 3, Sanibel's most abundant tree, *Sabal palmetto*. FIG. 4, Adjacent communities of *Spartina* and *Conocarpus*.



PLATE 1216. FIG. 5, Strangling fig around cabbage palm at edge of mixed woods. FIG. 6, Typical button mangrove thicket, with *Tillandsia* in center.

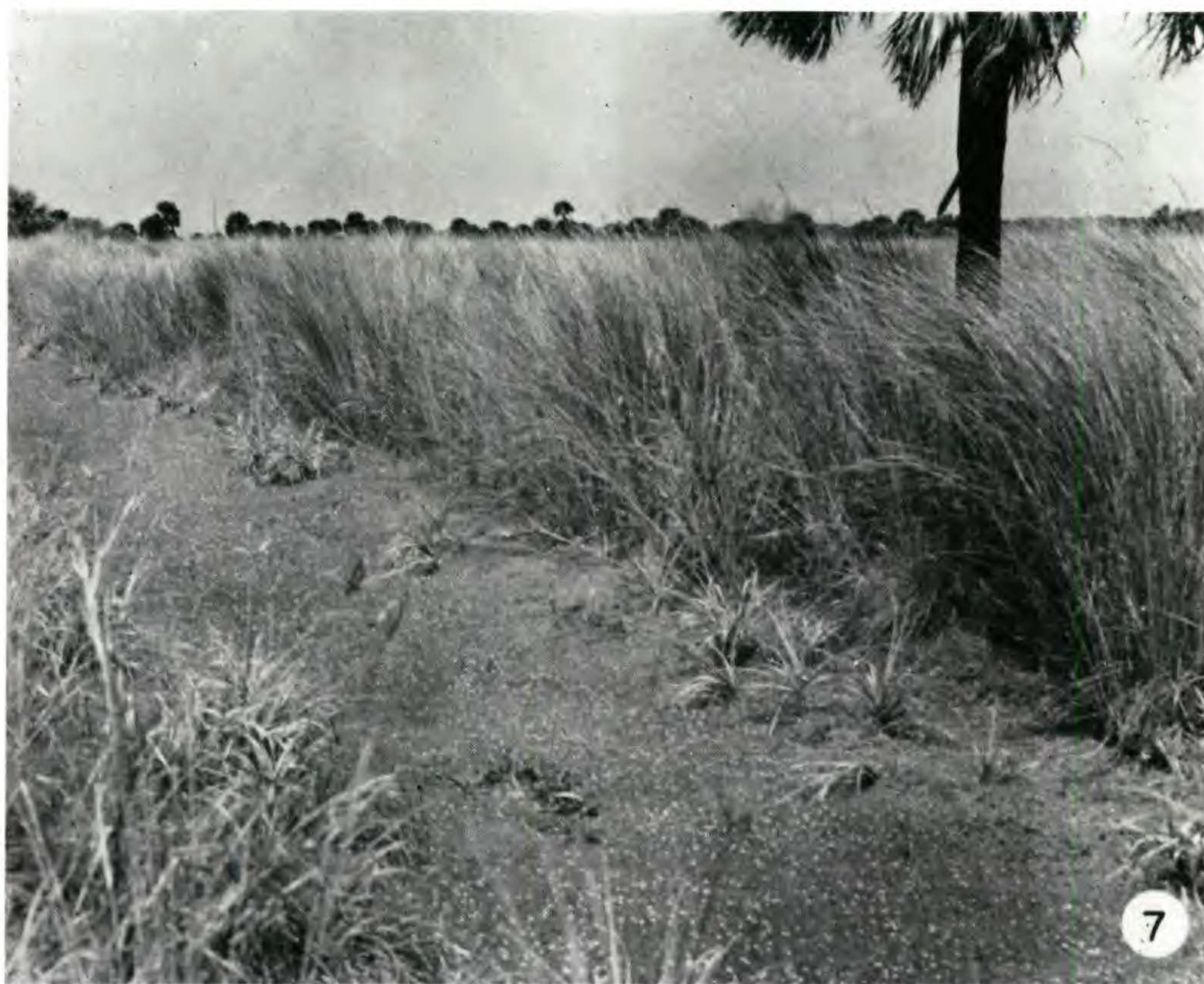


PLATE 1217. FIG. 7, *Bacopa monnieri* dominant in low places of *Spartina* marshes. FIG. 8, *Spartina* marsh, showing cabbage palm "islands," on the slightly higher ground of ancient shell ridges.

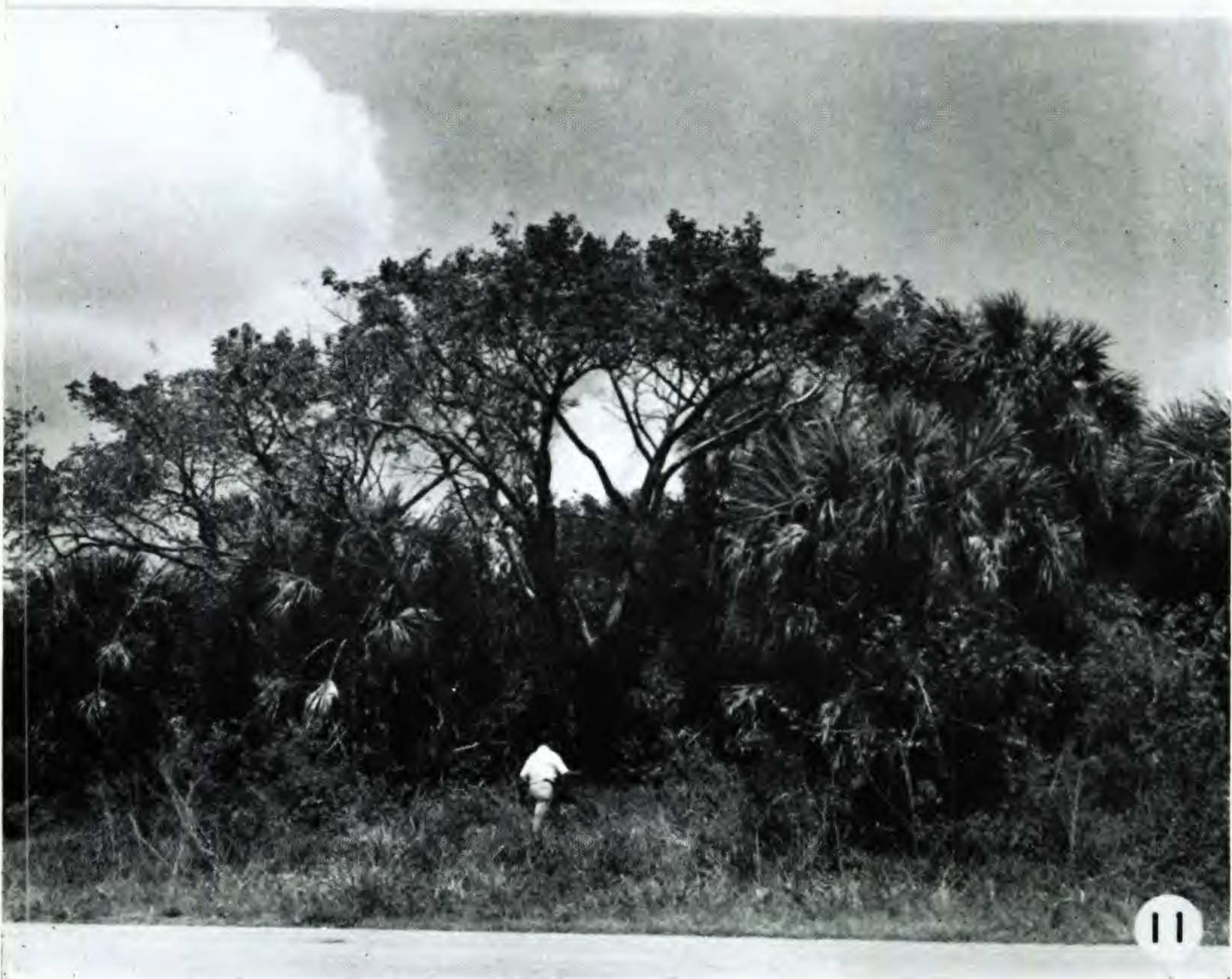


PLATE 1218. FIG. 10, Thicket with *Conocarpus*, *Sabal*, and *Yucca* in transition zone between grassland and *Conocarpus* swamps. FIG. 11, Gumbo limbo at edge of Palmetto jungle.